

REMARKS

Claims 1-16 and 18-29 are now in the application. Claims 1-16, 18, 19 and 23-29 are directed to the elected invention. Claims 20-22 are drawn to non-elected invention and may be canceled by the examiner upon the allowance of the claims directed to the elected invention.

The objection to the drawing has been taken care of by the replacement drawings attached to this response.

The specification has been amended to correct some inadvertent typographical errors and omissions.

Claim 1 has been amended to recite “A chemical mechanical polishing slurry composition for the polishing of chemical-based interconnects and non-volatile memory devices” in place of “An aqueous slurry composition” to further clarify the type of composition to which the present invention is directed. The term “aqueous” was deleted since the claim explicitly includes water as a component of the composition. Claim 1 has also been amended to recite “that the abrasive particles comprise at least one member selected from the group consisting of silica, alumina, zirconia, titania, and ceria” as disclosed in the first paragraph on page 4 of the specification. In addition, claim 1 has been amended to recite a corrosion inhibitor for copper as disclosed, for instance, at page 5 lines 21 and 22 of the specification. Furthermore claim 1 has been amended to recite that the quaternary ammonium hydroxide is “for stabilizing the abrasive particles” as disclosed on page 4, lines 18-22 for purposes of clarification.

Claim 4 has been amended to recite “comprise” in place “comprises” to correct a grammatical error and not to limit its original scope. Claims 6 and 7 have been amended for purposes of clarification to recite “by weight” and not to limit its original scope. Claim 8 has been amended to correct the formula of the quaternary ammonium hydroxide and not to limit its original scope.

In view of the amendment to claim 1, claim 17 has been cancelled and claim 18 has been amended to depend from claim 1. This amendment to claim 18 does not limit its original scope. In addition, the amendment to claim 18 overcomes the formalistic rejection under 35 USC 112 second paragraph concerning the lack of antecedent bases.

The amendment to claim 22 corrects an inadvertent error to recite “period 4d” in place of “group 3d” for purposes of clarification and not to limit its originally intended scope.

New claims 23 and 24 find support at page 5 lines 25 to 27 and page 6 lines 12-14, respectively. New claim 25 finds support at page 5, lines 14-16 and new claim 26 finds support at page 5, lines 16-17. New claim 27 finds support at page 5, lines 21-24. New claims 28 and 29 find support at page 7, lines 4-5 and page 5, lines 1-5, respectively.

The amendments to the specification, claims and drawing and newly presented claims do not introduce any new matter.

Claims 1-11, 13-17, and 19 were rejected under 35 USC 102(b) as being anticipated by or under 35 USC 103(a) as being obvious over US Patent 6,136,711 to Grumbine et al, (herein after referred to as “Grumbine”). Claims 12 and 18 were rejected under 35 USC 103(a) as being obvious over Grumbine.

Grumbine does not anticipate and does not render obvious the above claims. The present invention relates to certain slurry compositions which include among other components quaternary ammonium hydroxide and an acid having a pKa of about 2.5 or lower in order to provide an acidic pH of the slurry composition. According to the present invention, as discussed in the specification, the quaternary ammonium hydroxide improves the shelf life of the slurry by way of increasing colloidal stability. The data presented in the disclosure, for instance in page 11 in example 4 demonstrates that quaternary ammonium hydroxide are useful in improving the colloidal stability of the slurries in acidic pH, when compared to comparative examples prepared using ammonia, potassium hydroxide as well as the absence of a base. This problem addressed

by the present invention with respect to stability is an issue that has plagued the industry as discussed at page 2 lines 22 to 26 of the specification.

Grumbine fails to anticipate and fails to render obvious the above claims since, among other things, Grumbine does not suggest the use of a quaternary ammonium hydroxide compound for stabilizing an acidic slurry composition of the type described according to the present invention. Grumbine relates to a CMP slurry composition for tungsten which includes quaternary ammonium ion compounds as inhibitors for tungsten etching. However, the only disclosure of quaternary ammonium hydroxides in Grumbine appears at table 1 which shows that the two quaternary ammonium hydroxides were not effective as inhibitors of tungsten etching. Accordingly, it would be contrary to the requirements of Grumbine to employ a quaternary ammonium hydroxide in compositions along the lines of those described pursuant to the present invention.

Furthermore, it would not have been obvious to employ a corrosion inhibitor for copper in the composition suggested by Grumbine, since Grumbine relates to tungsten and not to polishing of copper. The particular tungsten corrosion inhibitor suggested in Grumbine would not necessarily be suitable as copper corrosion inhibitors. One of ordinary skill in the art would not consider tetramethylammonium hydroxide and tetrabutylammonium hydroxide to be suitable as copper corrosion inhibitors. In addition, one of ordinary skill in the art would not consider the preferred inhibitors of tungsten etching suggested by Grumbine (column 6, lines 10-19 and column 7, lines 3-10) to be suitable as copper corrosion inhibitors; namely glycine, aminopropylsiloxane, aminopropylsilanol, and mixtures thereof.

Claims 1-19 were rejected under 35 USC 103 (a) as being obvious over US Patent 6,471,735 to Misra et al. ("herein after also referred to as Misra"). Misra fails to suggest or render obvious the above claims since, among other things, it would not be obvious to employ a

corrosion inhibitor for copper in the compositions of Misra, since Misra relates to forming shallow trenched isolation structures and not for purposes related to treating copper.

Accordingly, no motivation exists for including a corrosion inhibitor for copper in the compositions suggested by Misra. Furthermore, Misra as appreciated by the examiner does not even remotely suggest the acidic pH as recited in the present claims. As discussed in the specifications, the pH is important along with the quaternary ammonium hydroxide for achieving a stabilized slurry composition. Nothing whatsoever in Misra would suggest such. Furthermore, Misra fails to suggest employing quaternary ammonium hydroxide in order to achieve colloidal stability.

Claims 1-3 and 5-19 were rejected under 35 USC 103 (a) as being obvious over US Patent publication application 2003-0079416A1 to Ma et al (herein after referred to as "Ma"). Ma does not render obvious the above claims since, among other things, Ma does not suggest employing a quaternary ammonium hydroxide for improving colloidal stability as discussed according to the present invention. In fact, Ma relates to a slurry composition based on an organic polymeric abrasive and is not concerned with stability of the abrasive in the composition. On the other hand, as discussed above, the present invention relates to providing slurries that exhibit enhanced stability. No motivation exists in Ma to employ a quaternary ammonium hydroxide in the type of slurry compositions according to the present invention for achieving improved colloidal stability of the abrasive particles.

Claims 1-19 were rejected under 35 USC 103 (a) as being obvious over US Patent publication 20040229461 to Darsillo et al ("herein after also referred to as Darsillo"). Darsillo fails to suggest or render obvious the present invention since, among other things, Darsillo fails to suggest employing a quaternary ammonium hydroxide for achieving colloidal stability as attainable pursuant to the present invention. Furthermore, nothing in Darsillo would suggest that a quaternary ammonium hydroxide is to be selected from among the possible bases described therein along with an acid having a pKa of less than about 2.5 from all of the suggested acids in Darsillo and expect to achieve the types of results attainable by the present invention. For

instance, Darsillo along with suggesting quaternary ammonium hydroxide compounds also suggest other bases such as potassium hydroxide and ammonium hydroxide. However, as disclosed in the specification, use of such other bases as potassium hydroxide or ammonia did not achieve the enhanced stability as attainable according to the present invention. Along these lines see page 11, example 4. In addition, the acids referred to by Darsillo include a large number of acids that have pKa values significantly greater than 2.5 and nothing in Darsillo would suggest the desirability of selecting from the plethora of acids mentioned therein those having a pKa of less than about 2.5. At most, selecting the combination of a quaternary ammonium hydroxide and an acid of pKa of less than about 2.5 for preparing a slurry composition from among all of the possibilities in Darsillo would have been quite fortuitous.

Furthermore, since both the acids and bases mentioned in Darsillo are for adjusting pH, it would seem counterintuitive to select both an acid and a base to adjust the pH. It would seem more likely that once the other ingredients of the slurry composition of Darsillo have been selected, the pH would then be adjusted as desired by adding, if necessary, one of the acid or the base but not both. It is further noted that none of the examples in Darsillo employ any base for pH adjustment. In addition, although Darsillo also suggest copper chelating agents that can include various acids, not all of the acids suggested therein have a pKa of less than about 2.5 and not all of the chelating agents are even acids. In fact, the preferred chelating agent is glycine. Accordingly, nothing with respect to the chelating agent would suggest to persons skilled in the art to select a pKa acid of less than about 2.5 and have any reasonable degree of expectation of achieving the results obtainable by the present invention.

The cited references fail to anticipate the present invention. In particular, anticipation requires the disclosure, in a prior art reference, of each and every recitation as set forth in the claims. See *Titanium Metals Corp. v. Banner*, 227 USPQ 773 (Fed. Cir. 1985), *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 1 USPQ2d 1081 (Fed. Cir. 1986), and *Akzo N.V. v. U.S. International Trade Commissioner*, 1 USPQ2d 1241 (Fed. Cir. 1986).

There must be no difference between the claimed invention and reference disclosure for an anticipation rejection under 35 U.S.C. 102. *See Scripps Clinic and Research Foundation v. Genetech, Inc.*, 18 USPQ2d 1001 (CAFC 1991) and *Studiengesellschaft Kohle GmbH v. Dart Industries*, 220 USPQ 841 (CAFC 1984).

The mere fact that cited art may be modified in the manner suggested by the Examiner does not make this modification obvious, unless the cited art suggest the desirability of the modification. No such suggestion appears in the cited art in this matter. The Examiner's attention is kindly directed to *In re Lee* 61 USPQ2d 1430 (Fed. Cir. 2002) *In re Dembiczak et al.* 50 USPQ2d. 1614 (Fed. Cir. 1999), *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984), *In re Laskowski*, 10 USPQ2d. 1397 (Fed. Cir. 1989) and *In re Fritch*, 23, USPQ2d. 1780 (Fed. Cir. 1992).

In *Dembiczak et al.*, supra, the Court at 1617 stated: "Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references. See, e.g., C.R. Bard, Inc., v. M3 Sys., Inc., 157 F.3d. 1340, 1352, 48 USPQ2d. 1225, 1232 (Fed. Cir. 1998) (describing 'teaching or suggestion motivation [to combine]' as in 'essential evidentiary component of an obviousness holding'), In re Rouffet, 149 F.3d 1350, 1359, 47 USPQ2d. 1453, 1459 (Fed. Cir. 1998) ('the Board must identify specifically...the reasons one of ordinary skill in the art would have been motivated to select the references and combine them');..."

Also, the cited art lacks the necessary direction or incentive to those of ordinary skill in the art to render a rejection under 35 USC 103 sustainable. The cited art fails to provide the degree of predictability of success of achieving the properties attainable by the present invention needed to sustain a rejection under 35 USC 103. *See Diversitech Corp. v. Century Steps, Inc.* 7 USPQ2d 1315 (Fed. Cir. 1988), *In re Mercier*, 187 USPQ 774 (CC)A 1975) and *In re Naylor*, 152 USPQ 106 (CCPA 1966).

Moreover, the properties of the subject matter and improvements which are inherent in the claimed subject matter and disclosed in the specification are to be considered when evaluating the question of obviousness under 35 USC 103. *See Gillette Co. v. S.C. Johnson &*

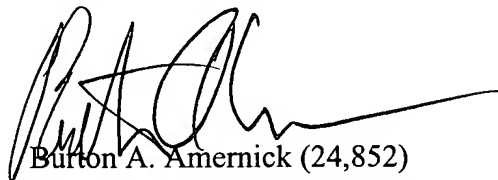
Son, Inc., 16 USPQ2d. 1923 (Fed. Cir. 1990), *In re Antonie*, 195, USPQ 6 (CCPA 1977), *In re Estes*, 164 USPQ (CCPA 1970), and *In re Papesch*, 137 USPQ 43 (CCPA 1963).

No property can be ignored in determining patentability and comparing the claimed invention to the cited art. Along these lines, see *In re Papesch*, supra, *In re Burt et al*, 148 USPQ 548 (CCPA 1966), *In re Ward*, 141 USPQ 227 (CCPA 1964), and *In re Cescon*, 177 USPQ 264 (CCPA 1973).

In view of the above, consideration and allowance are, therefore, respectfully solicited. In the event the Examiner believes an interview might serve to advance the prosecution of this application in any way, the undersigned attorney is available at the telephone number noted below.

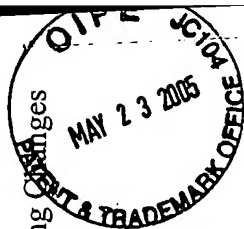
The Director is hereby authorized to charge any fees, or credit any overpayment, associated with this communication, including any extension fees, to Deposit Account No. 22-0185.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Burton A. Amernick', with a long horizontal flourish extending to the right.

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— Cu — Ru — Pd — Fe-Ni

